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AUTHOR Patterson, G. R.
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ABSTRACT

This report is an attempt to analyze the aggression which occurs within extended dyadic interchanges of parent and child, husband and wife, or sibling and peers. An argument is made for a "performance" theory of children's noxious behaviors based on the assumption that most children, exposed to modeling and reinforcing contingencies through which they learn the techniques of coercive behaviors, differ with regard to performance rates. It is proposed that it is necessary to search for the immediately impinging stimuli associated with altered probabilities in ongoing noxious behaviors. These stimuli may be found in various dyadic interchanges between the child and other family members. Studies based on across-subjects' daya are reviewed which show networks of controlling stimuli for many noxious behaviors observed in family interactions. A pilot study using an extensive series of intraindividual data for one boy is described. The data replicated the stimulus network findings for noxious behaviors as well as the construction of response classes. The interactions between extended interchanges of response class and maintaining stimuli are described in a probability tree. The latter demonstrated the impact of the environment on the child as well as that of the child on the environment. (CS)

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DYADIC AGGRESSION: A "SIX-SECOND" PERFORMANCE THEORY ABOUT CHILDREN[1]

G. R. Patterson
Oregon Research Institute
and
Department of Special Education
University of Oregon

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This report is concerned with only a limited facet of the broad spectrum of problems usually subsummed under the label "aggression." The emphasis is upon aggression which occurs within extended dyadic interchanges of parent and child, husband and wife, or sibling and peers.

Neither member of the dyad can successfully avoid these interactions in that they are assigned as permanent or long-term members of the same small system. The training takes place by small steps. Neither member tracks, or stores, information from the occurrence of the minute contingencies which gradually shape their behavior. As a result, family members who profess to love one another often find themselves in the odd position of inflicting pain upon each other at extraordinarily high rates. It is for these reasons that the process has been labeled as "dyadic." The studies suggest a sequence of "training" experiences in which the child, in some families, acquires techniques employing increasingly aversive stimuli.

The limited focus upon dyadic interchanges within the home is unlikely to identify variables which will relate to some other aggressive phenomena such as race riots, infantry combat, ghetto delinquency, bombing in Cambodia, or presidential assassins. It is assumed in each instance that the determinants may be different; they, in turn, suggest loosely connected networks of variables rather than any monolithic theory of aggression.

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In considering dyadic aggression, two tactical decisions were made which largely determined the content of this investigation. The first was the decision to use, as in the general paradigm, the social learning principles outlined by Bandura and Walters (1963), Gerwirtz (1969), and Skinner (1953). The second decision was to rely heavily upon data from field observations as a basis for generating and partially testing hypotheses.

Originally it was planned to study only a limited set of behaviors such as "Hit." However, field observations (Reid, 1967) suggested a number of additional behaviors which seemed to have functional characteristics similar to those noted for Hit. Eventually 13 or 14 "noxious" behaviors were identified which occurred with rather high frequency by most boys labeled as "aggressive." The boys seemed to employ these behaviors as both punishment and negative reinforcers in the task of shaping and controlling family members.

It is hypothesized that in our culture most children are allowed to use some mildy aversive behaviors at rather high rates, e.g., "Non-Comply," "Disapproval," and "Negativism." However, other noxious behaviors such as "Yell," "Hit," or "Destructiveness," are perceived by parents to be more "deviant" and are more likely punished when they occur. In one study, the correlation between the parents mean ratings of how upset the behaviors made them feel and the actual rate of occurrence of these behaviors was -.50 ($df = 12$; $p < .05$). The more "aversive" behaviors tended to occur at lower rates.

It is assumed that children who display behaviors rated extremely aversive, e.g., "Hit," will first have learned to employ all other less noxious behaviors as well. However, the relation between high and low rate noxious behaviors is not systematic, e.g., not all children who "Non-Comply," or "Disapprove" at high rates go on to be trained to "Hit" (low rate response). In one study, a Guttman scalogram analysis was made of 14 noxious behaviors for two samples of boys (Patterson & Dawes, in preparation). The analyses for the sample of 22 normals showed that all children who had learned low rate (extremely aversive) noxious responses displayed all of the preceding levels of high rate noxious behaviors as well. The higher rate responses were those perceived by mothers as being less "aversive." The analysis was replicated for a matched sample of 27 aggressive boys, also using observation data as the basis for the analyses.

Regardless of which level of aversive stimuli is employed, all of the responses are thought of as variations in pain control techniques. The general process has been labeled "coercive" and is discussed in Patterson and Cobb (1973) and Patterson and Reid (1970).

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The Learning of Coercive Behaviors

Three different "mechanisms" are thought involved in the acquisition of coercive behaviors: (1) instinctual patterns; (2) modeling; and (3) reinforcement. Ethological studies of children and primates reviewed by Eibl-Eibsfeldt (1973) shows that the complex pattern of noxious behaviors labeled "temper tantrum" may be unlearned. He noted that a deaf and blind girl displayed the same pattern of facial grimace, muscle tension, and accompanying behaviors found in normal children. He also referred to studies which demonstrated that young primates displayed similar patterns of behaviors.

In keeping with this approach, one might speculate that the newborn's repertoire of screaming and crying behaviors may have survival value in that they can be used to quickly train most mothers in the skills necessary to feeding and temperature control. The infant presents these stimuli to the mother until she makes the correct responses at which point the infant terminates the aversive stimulation. Conceivably, grandmothers, aunts, and infants are all involved in teaching some mothering skills.

The young child could learn coercive skills by observing these behaviors in siblings and parents (Bandura, 1973). They could easily teach him various refinements in application which are beyond the repertoire of the infant. Six to 10 observation sessions in each of 27 homes of normal families showed that yelling, teasing, and hitting by young children occurred at the rate of .025, .021, and .014 responses per minute (Jones, Reid, & Patterson, 1973)! Certainly, these findings suggest a rather rich modeling schedule. Similarly, observations in two nursery schools showed a rich presentation of peer modeling for verbal and non-verbal modes of attack (Patterson, Littman, & Bricker, 1967), e.g., a range of from 11 to 40 verbal and non-verbal attacks per session! These experiences, plus the range of models available in the mass media, attest to the likelihood that most or all children have ample opportunity to learn coercive skills. The hypothesis is, then, that by the age of four or five while children have "learned" the garden variety coercive behaviors, they differ, however, in the rate with which the behaviors are performed. The task for a dyadic theory of aggression is to account for these differences in performance.

Reinforcement from interchanges with peers, siblings, and adults supplements modeling in the early development of coercive skills. As shown in one field study, the reactions of the "victims" train the attacker as to which response, and which victim, to select (Patterson et al., 1967). In the initial tryout of these complex coercive skills, which may have been

modeled for him, the reinforcement by the first victims determine whether coercive behaviors will remain at near zero rate or gradually accelerate in rate of performance. This process of accelerating performance can be very subtle; for example, it can begin with the child in the role of victim but gradually teach him to initiate his own coercive behaviors. In the nursery school study cited above, 21 children were identified, each of whom had displayed two, or less, coercive behaviors in the first five nursery school sessions. During the next phase, 12 of this group were observed to interact at high rates with their peers and were victimized an average of 70 times. For these 12, their counter aggression was reinforced 69% of the time by the withdrawal of the attacker. The data showed that this "reinforcement" was followed by an increase in the rate with which these children initiated coercive interchanges with other children. Children who were seldom victimized, or were not successful in their counterattacks, showed little or no change in the rate with which they initiated coercive interchanges. Presumably, this drama is repeated in the home, the neighborhood, and the school. These multiple training programs produce children who differ markedly in their performance rates for coercive behaviors.

In summary, it is assumed that for most children in our society, the "learning" of coercive skills is a "given." The problem for a "theory" of aggression is to identify these variables which determine inter- and intraindividual variations in performance.

The Performance of Coercive Behaviors

There seem to be three different aspects of the problem of getting at variables relating to performance. (1) Among children, rates of coercive behaviors seem to be specific to the setting. Observation data collected within the home and the school for 17 boys referred because of problems in both settings showed a correlation of -.02 for measures of coercive behaviors occurring in the two settings (Patterson, 1973a). This finding was in keeping with those obtained in other studies by correlating parents' and teachers' ratings of personality traits (Becker, 1960). Further support for the hypothesis of setting specificity is provided by manipulation studies. For example, Skindrud (1972) and Wahler (1969) showed that in fact generalization to the classroom did not occur when rates of coercive behaviors were significantly reduced in the home. A "theory" must be able to account for these setting differences in the performance of aggressive behaviors.

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The second phenomenon is illustrated in the plethora of publications which hold "settings" and "individuals" constant, but obtain repeated observations over time on the same subject. The baseline data for most of the studies show impressive intraindividual variations over sessions. It is the opinion of this writer that an adequate "performance theory" of children's aggressive behaviors must be able to account empirically for significant components of variance in distributions of noxious behaviors (a) across trials for individual subjects; (b) across settings; and (c) across subjects.

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Insert Figure 1 about here

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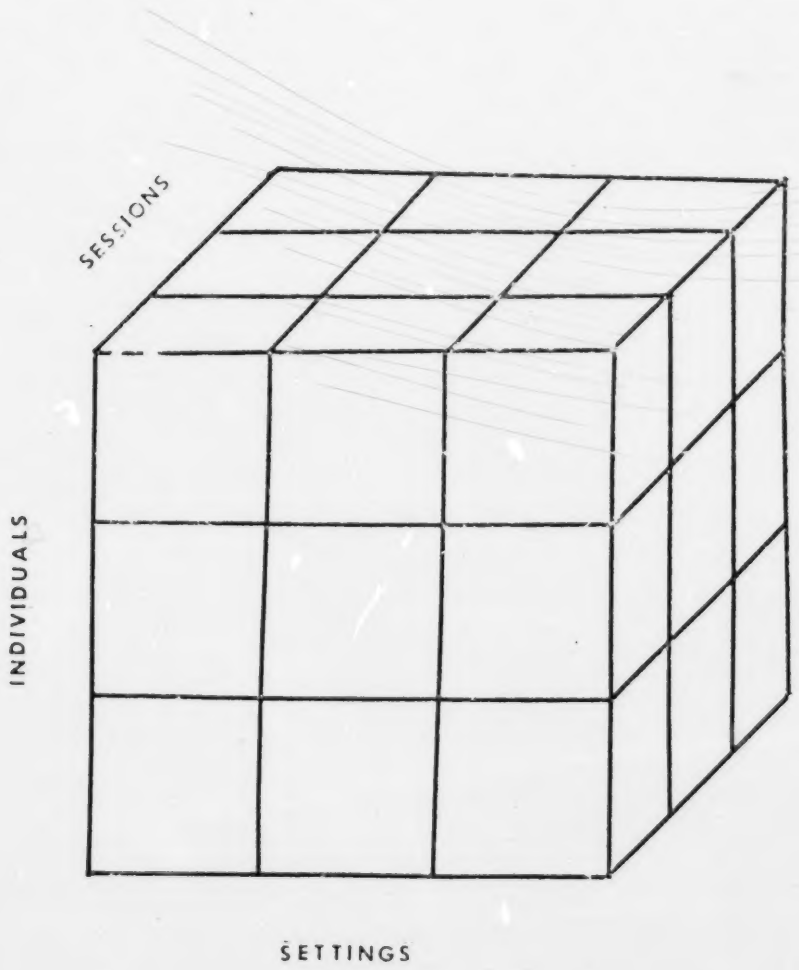
In considering these problems, it is assumed that each source of variation (persons, settings, time) may represent the outcome of a differential weighting of a general set of determinants. As a general case, it was assumed (Patterson & Cobb, 1973, pp. 148-150) that certain stimuli acquire special status in controlling the occurrence, or non-occurrence, of noxious behaviors. Presumably, intraindividual variations in performance over time covary with variations in the densities of controlling stimuli.

On the other hand, interindividual and setting variations represent differences in mean level of performance. It is assumed that these differences are determined primarily by schedules of positive and negative reinforcement and to a secondary extent by differences in the density of occurrence of stimuli that control coercive behaviors.

The measurement of "reinforcement schedules" or "density of controlling stimuli" each presents unique problems. Currently there are no feasible methods appropriate for identifying reinforcers for the individual child as they occur in situ. The propsect of carrying out a series of ABAB designs for each potential reinforcer, for each of the 14 noxious behaviors, separately for each child simply did not seem feasible. As an alternate analyses of sequential data were carried out to identify positive reinforcers for noxious behaviors. However, the demands for large populations of events were so extraordinary that even 72 hours of Denny's data were not sufficient to the task. A third, and less satisfactory approach, was to define a priori "positive consequences" for boys' noxious behaviors and test for intersubject differences. Such an analysis did support for the notion of high schedules of "positive" support covarying with interindividual differences in performance rate (Sallows, 1972). For the moment, then, no feasible means exist to directly test hypotheses about the contribution of reinforcement schedules to the in situ performance of coercive behaviors.

FIGURE 1

SOURCES OF VARIATION IN PERFORMANCE



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There does seem to be the possibility of identifying controlling stimuli as they occur in situ. A rather elaborate coding system was developed to sample sequential dependencies found in family interaction. Proceeding in a manner similar to that ascribed by Hinde (1973) to ethological field studies, a search is made for those stimuli whose occurrence is associated with altered probabilities of occurrence for responses which follow. For the moment, no specific hypotheses are entertained as to the process by which a previously neutral stimulus acquires status as a controlling stimulus. Presumably, mere contiguity or in some cases reinforcing contingencies serve as the mechanisms. As noted by investigators such as Bandura (1973), Berkowitz (1973), and Ulrich, Dulaney, Arnett, and Mueller (1973), contiguous association with prior attacks may increase the effect of a stimulus as an "elicitor". Reynolds, Catania, and Skinner (1963) showed that stimuli associated with the reinforcement of aggression may also acquire an "eliciting effect." Those associated with non-reinforcement were associated with reduced probabilities of future attacks.

General Strategy

The approach to identifying controlling stimuli consists of two phases. The first relies upon field observations which identify the functional relations holding between certain environmental events on the one hand, and behavioral events on the other. This phase identifies those stimuli which merit more intensive study. The second stage will consist of experimental manipulations, in the field, to demonstrate that the stimuli do indeed control behavior.

The general emphasis upon beginning with field observation is, of course, the hallmark of both the ecological psychologist (Barker, 1963) and the ethologists (Hinde, 1973). The use of experimental manipulations to test for causal relations between environmental events and behavior of the organism as a second stage of analysis is the sequence employed to such good effect by the ethologist (Eibl-Eibsfeldt, 1970; Hinde, 1973). To date, the ORI effort in the analysis of stimulus control has emphasized primarily phase one in the search for regularly recurring stimuli which control noxious (Patterson, 1973c; d; Patterson et al., 1967; Patterson & Cobb, 1971; 1973) and prosocial (Patterson & Cobb, 1971) behaviors. Only two experimental manipulations of controlling stimuli have been carried out (Atkinson, 1970; Devine, 1971). Both studies were carried out in the laboratory using mothers and their preschool children as participants. The multiple baseline design clearly established the control by "mother nonavailability" over the childrens' coercive behaviors. Thus far, a causal status has been established for only this single controlling stimulus.

Extensive preparations were required before it was possible to carry out even this first set of field and laboratory studies. Three years of work were focused upon the development of field observation code systems which would provide reasonably reliable descriptions of the serial dependencies found in family interaction (Reid, 1967). The revised code system is now available for use by other investigators (Patterson, Ray, Shaw, & Cobb, 1969), and the data readily lends itself to computer analysis. Many of the traditional psychometric problems inherent in the use of such procedures have been explored; e.g., observer bias, observer drift, effects of observer presence, event sampling, effects of complexity of interaction upon observer reliability, together with questions about the factor structure and validity of the code system itself. The entire series of methodological studies were summarized by Jones, Reid, and Patterson (1973).

Beginning in 1968, the observation code was used to collect data in the homes (and for some in the schools as well) of boys referred for severe conduct problems. Each family was observed for from six to 10 observation sessions in the home. A small number of families were observed for more than 50 hours. Each of the observations was carried out during the time immediately preceding the dinner hour. The sessions were semi-structured in that the families were instructed to remain within the home for the session and to keep the TV turned off. Certainly such restrictions as "everyone at home" and "sitting in rooms sans TV" are not typical Americana. However, structuring of this kind was deemed necessary. The data obtained from these families constituted a "fee" in payment for treatment which they later received (Patterson, Cobb, & Ray, 1973; Patterson & Reid, 1973).

In addition, volunteer families were obtained by newspaper ads. The families were carefully screened to insure that none of the family had received psychiatric treatment in the last two years and were matched for SES level, number of children, father presence or absence, and age of the "problem child" within the treatment families. The volunteers were paid for their services.

These observation studies continue through the present time. Data are now available for 60 families with problem children and 32 families of "normal" boys. The data from these samples constitute our "field studies" of phenomena related to dyadic aggression.

Some Preliminary Findings

Behavior Comes in Bursts

Our very first exposure to observing coercive behaviors occurring in the natural environment revealed that the behaviors seemed to come in "bursts." If one response occurred, it seemed the case that a number of similar responses would follow in short order. Observations of children in two nursery schools (Patterson et al., 1967) showed that the high rate aggressive child frequently displayed a series of three to 20 coercive responses run off in rapid succession. Lower rate children, on the other hand, were characterized by shorter "chains" and longer intervals between bursts.

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Insert Figure 2 about here
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The following data were obtained in the home of a high rate aggressive boy (Patterson, 1973b). For illustrative purposes, the occurrence of any one of the 13 noxious behaviors during a six-second interval was indicated by a "1" and non-occurrence by "0". These raw data for the 100 consecutive six-second intervals illustrate the "burst" quality to his coercive behavior. The lag 1 correlation of .50 confirms the visual impression that one response tends to follow another. Over an entire 10-day series, the average autocorrelation for this child was .28 (.20 would be significant at $p < .05$). As might be expected, the lower order lag correlations were obtained when the rate for coercive behaviors was low.

The data for larger time intervals showed a similar phenomenon. Figure 3 summarizes two days of data for 10 consecutive 10-minute intervals for the same child. The first 60 minutes of data were collected on the first day and the next 40 on the second day.

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Insert Figure 3 about here
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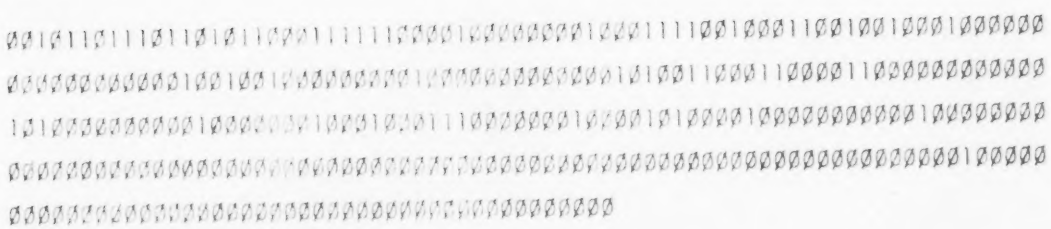
The dependent variable was a composite score labeled Hostile (comprised of Whine, Yell, and Disapproval). Presumably, as the time intervals become larger, e.g., hours, days, or weeks, the serial dependencies reflected in the autocorrelations would begin to drop, but nevertheless one would expect intraindividual variability to be the order of the day.

FIGURE 2

BURSTS FOR SIX-SECOND SEGMENTS OF TOTAL COERCIVE

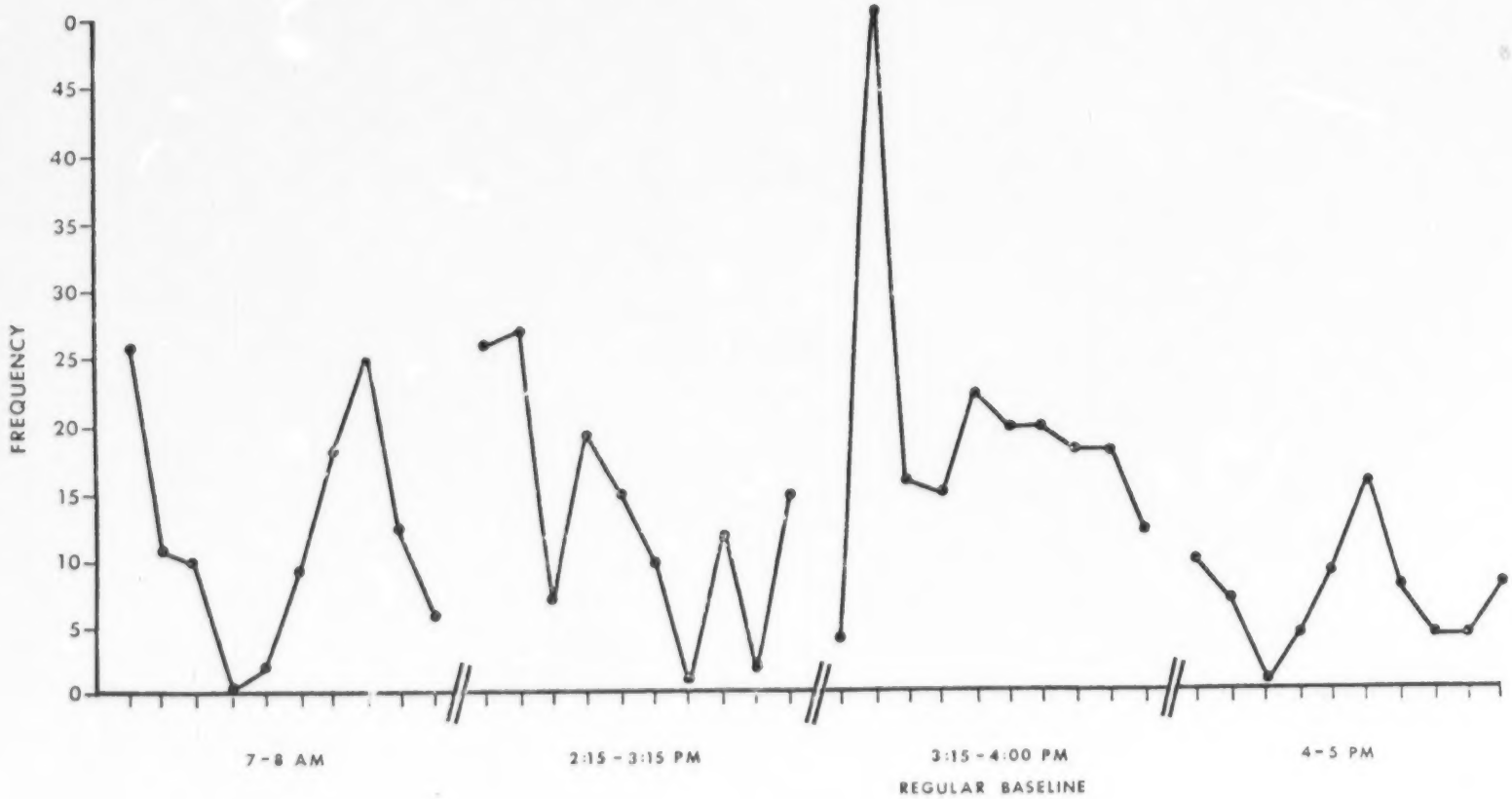


LAG 1 AUTOCORRELATION

(DAY 3) .50

FIGURE 3

FREQUENCY OF DENNY'S HOSTILE BEHAVIORS



Some Preliminary Findings

Search for Networks of Controlling Stimuli

There were a set of assumptions made in initiating the work. The first one was that much of the control over ongoing behavior is to be found within the immediately prior social stimuli which impinge upon the child. A thesis by Karpowitz (1971) analyzed interaction from deviant and normal boys. He searched for patterned antecedents occurring within the prior 18 seconds. He found that only 4% of all possible stimulus patterns accounted for the antecedents for 63% of the antecedents for deviant responses. For the deviant behaviors, half of the significant antecedents were found by analyzing only the immediately prior six seconds. The assumption that much information would be obtained by simply analyzing antecedents occurring six seconds prior to the response seems supported by the Karpowitz (1971) study. It was also vindicated by the findings outlined below.

The next assumption was that there would be some similarity in the networks of stimuli, for deviant R_j's, obtained for deviant and non-deviant families. In the study by Patterson and Cobb (1973), 27 boys of problem families and 27 boys of non-problem families were analyzed to identify the social stimuli associated with the altered probability of initiating each of 13 coercive behaviors. Conditional probabilities were calculated for each coercive behavior given each of 29 antecedents which had preceded the response in the prior six-second interval. These conditional probabilities were compared to the base rate probability of occurrence for the R_j. Those antecedent stimuli associated with significant increases $(p(R_j/A_i) > p(R_j)$ were labeled "Facilitators" (S^F) and those with decreases in probability of coercive occurrence were labeled as "Inhibitors" (S^I).

The analysis of 10,626 new initiations by problem boys and 3,378 initiations by non-problem boys produced well-defined networks of facilitating and inhibitory stimuli for 10 of the noxious behaviors for the problem sample and six R_j's for the normal sample. For four of the variables, there were three to seven antecedent stimuli held in common. This suggested an appreciable amount of overlap in controlling stimuli for those R_j's for which sufficient data were available for the analysis. The overlap is illustrated by considering the network of S^F's obtained for the R_j, "Negativism."

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Insert Figure 4 about here

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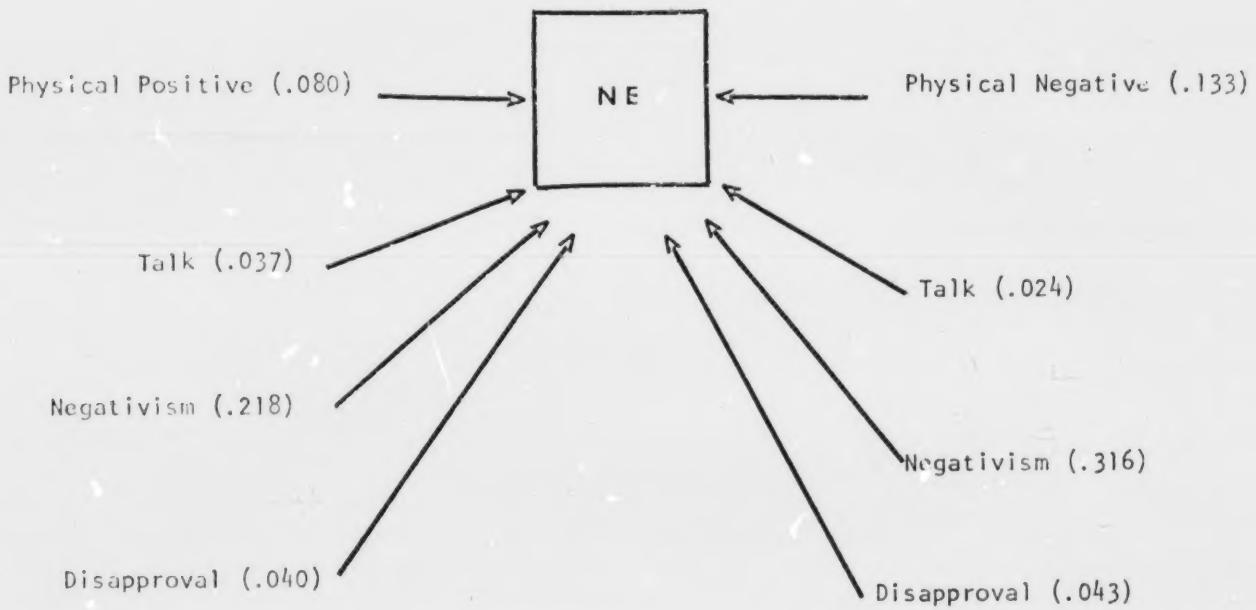
FIGURE 4

STIMULI CONTROLLING THE INITIATION OF "NEGATIVISM"

S^F's for Problem Boys
p(NE) = .026 Initiations

S^F's for Non-Problem Boys
p(NE) = .186 Initiations



GROUP OVERLAP 71.8%

If replicated for other R_j's and for other samples, such findings would suggest some general similarities between problem and non-problem families in terms of the variables accounting for the performance of coercive behaviors.

Presumably, problem and non-problem families would differ in the rates with which critical S^F's and S^I's occurred. The data for $p(A_i)$ for S^F's and S^I's identified in both samples suggested that the S^F's may be a key determinant for individual differences in rate of coercive behaviors. Neither the number of S^F's nor the base rate values for the S^F's controlling the 14 noxious R_j's differentiated the two samples (Patterson & Cobb, 1973). However, every coercive behavior was associated with a longer list of S^I's for the normal sample than for the clinical sample. The ratios of base rate R_j's for the two samples were correlated with the ratios of the of the S^I's for the two samples. The rho of +.48 ($df = 11$; $p > .05$) suggested that normal families may supply clearly defined punishing or non-reinforcing contingencies for many more potential antecedents. Normal families may have more clearly defined "no" signals relevant to displays of noxious responses.

A replication study currently underway will attempt to duplicate these networks and subject some of the S^F's and S^I's to experimental manipulations similar to that carried out by Atkinson (1970) and Devine (1971). In such future studies, the manipulations will occur within the home rather than in the laboratory. The key agents (parents) will be prompted to reduce or to accelerate the presentation of their S^F's and S^I's. These controlling stimuli for R_j's will be identified from baseline observations made in the home.

Search for Classes of R_j's

The problem which plagues this type of approach lies in the obvious paradox that the behaviors of most interest to the clinician (e.g., coercive responses) are relatively low rate. On the average, all "coercive" responses take up only five to 10 percent of the child's aggressive total repertoire of family interactions. For example, in the Karpowitz (1971) study, only .047 of the child's total interactions with family members would be coded as fitting one of the 14 categories of noxious behaviors. To meet this problem, the amount of observation was quadrupled for some subjects (Patterson, 1973c). Another reasonable tactic was to search for communalities among responses and use the resulting classes of coercive responses as dependent variables.

The Patterson and Cobb (1973) study investigated the possibility of constructing classes of noxious responses based upon the communalities in stimulus networks. Two classes were obtained.

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Insert Figure 5 about here
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The first Social Aggression was comprised of Hit and Tease, the agents involved as "dispensers" were largely younger siblings. The base rate of occurrence for the class was only .011 initiations which was rather low for use as a dependent variable. The second class, however, seemed more promising. It was comprised of five different responses. The class was labeled Hostility; most of the controlling stimuli were provided by the older sister and the mother.

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Insert Figure 6 about here
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The fact that its base rate was .110 initiations made it look promising. In keeping with the findings by Karpowitz (1971), for another sample of children, many of the S^r's controlling the initiation of these noxious behaviors seemed to be aversive. This raises the possibility that negative as well as positive reinforcement mechanisms might be involved in strengthening its occurrence.

The foregoing analyses were based upon 29 potential Ai's; the data, however, were provided by all family members other than the deviant child. To gain further perspective on this possible confounding, exploratory studies were initiated to test the application of stimulus control analysis to intrasubject variations. Fifty observation sessions were carried out within the home of one extremely high rate aggressive six-year-old boy (Patterson, 1973c). Later 22 additional sessions were carried out during the three months of intervention. In the first analysis of this data, an attempt was made to replicate the earlier across subject analysis in identifying stimulus networks and response classes for this child.

The analysis of 742 new initiations by Denny during the baseline study showed that only 10 of 14 noxious responses occurred at a rate sufficient for analysis (Patterson, 1973d). Of these, eight different S^r's provided by family members controlled the boy's noxious behaviors. A comparison with the earlier study showed that all eight controlled the same noxious behaviors identified in the across subjects analysis!

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FIGURE 5

STIMULUS CONTROL FOR SOCIAL AGGRESSION

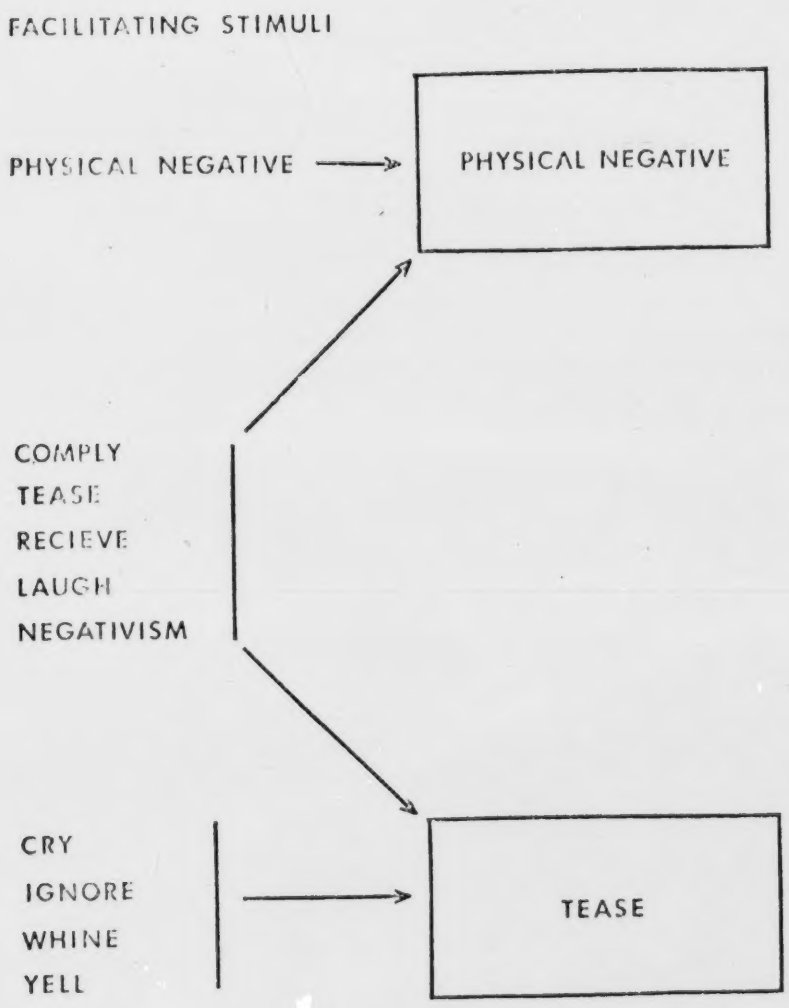


FIGURE 6

STIMULUS CONTROL FOR HOSTILITY

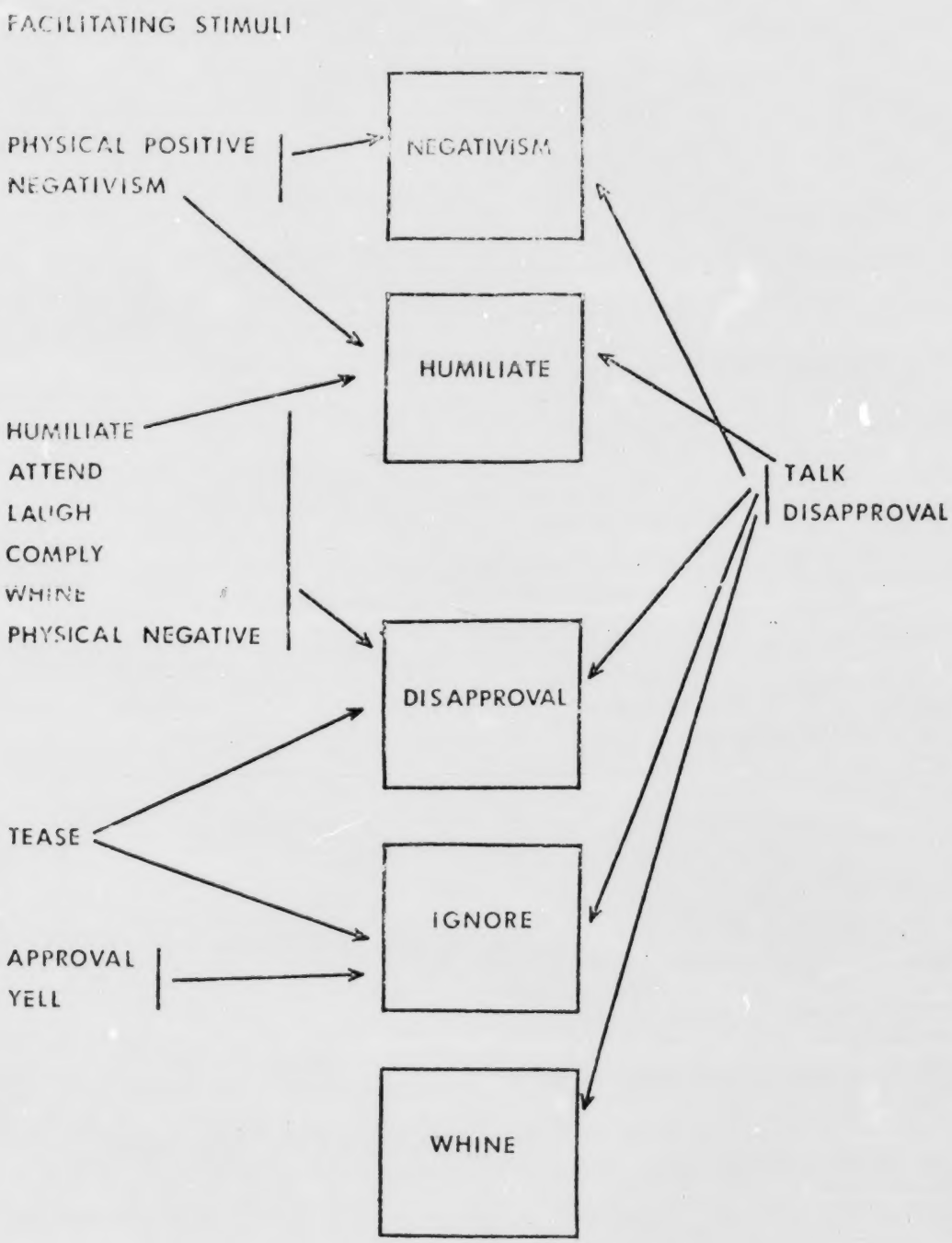
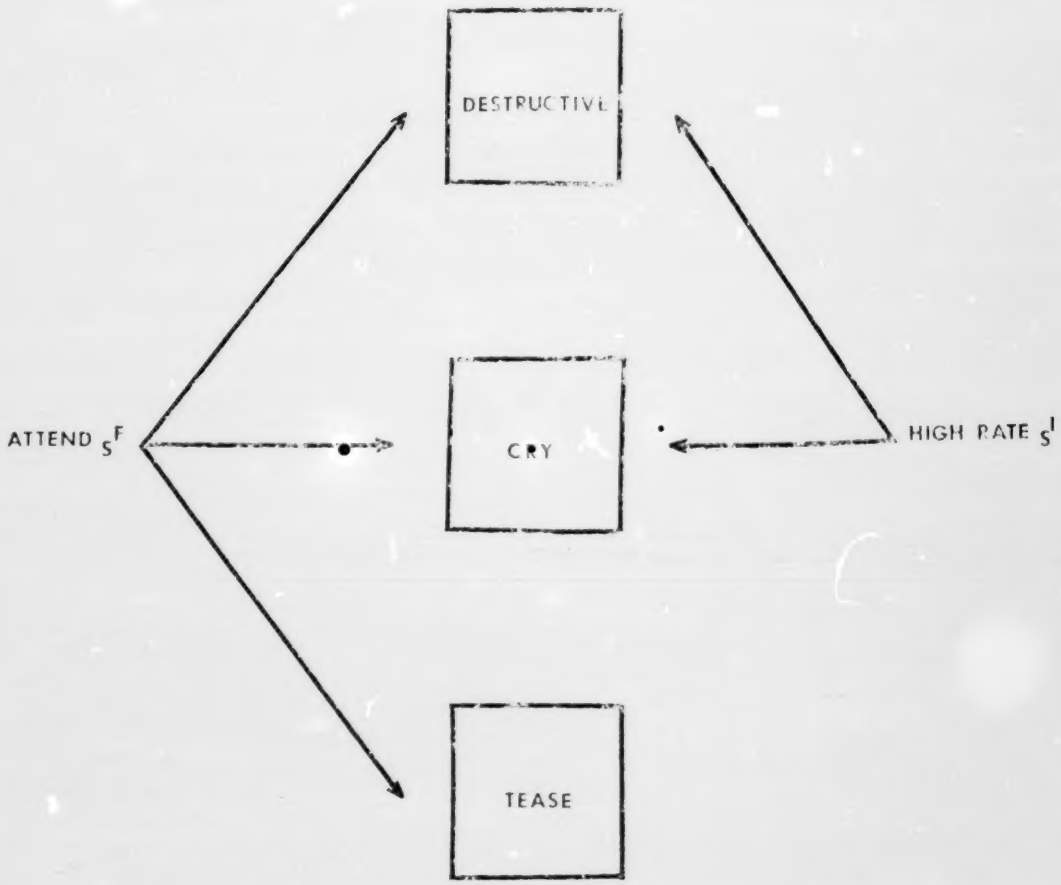


FIGURE 7

STIMULI CONTROLLING DENNY'S IMMATURE BEHAVIORS
(ACROSS AGENTS ANALYSES)

FACILITATING STIMULI

INHIBITORY STIMULI



$p(IM)$ = .0646 INITIATIONS

Two classes of responses were identified. The first was labeled Immaturity, a class which seems to be idiosyncratic to Denny. A second class was comprised of Whine, Disapproval, and Yell, and to a lesser extent, Negativism. Because it was so reminiscent of the findings for the across subjects analysis, it was labeled Hostile. In fact, the primary S^F and S^T controlling its initiations were similar to those found earlier. This class accounted for almost a quarter of his initiations.

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Insert Figure 8 about here
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Both this and the prior identification of the class Hostile shared a common problem. Because of the problem of insufficient sampling, for some R.'s it had been necessary to collapse the data across agents. To clarify the potentially unique contribution of father, mother, or younger sister to Denny's behavior, Hostile was used as a dependent variable for the iterative analysis.

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Insert Figure 9 about here
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The findings from this second analysis are summarized in Figure 9 and reveal some additional findings, e.g., mother's "Play" behavior functioned as a previously unidentified S^T and father's "Command Negative" served as an S^T. Clearly, it seems necessary to search for Ai's separately by code categories and agents. This in turn emphasizes the need for iterative procedures in identifying significant antecedents.

The most effective statement about the contribution of Facilitating Stimuli to our understanding of Denny's coercive behaviors would be found in statements about our ability to predict those behaviors. While the networks were identified on the basis of Denny's initiations, the question arises as to how well the information about S^F's would enable one to predict his general behavior. Of the 18,900 behaviors exhibited by Denny during the baseline period, 2,261 were Hostile responses. The general baseline value $\underline{p}$(Ho) was .1196. The conditional probability of Hostile given the combined information from all four S^F's was .2007. One would, of course, expect that the sample from which the S^F's were derived would show an increment of this kind. A more adequate test would be based upon a non-derivation sample. The 22 sessions obtained during intervention produced a total of 9,867. Of these responses of Denny's, .0773 were Hostile behaviors. Presumably, the modest reduction in rate from the baseline value represents the effect of the treatment program. The increment, however, in "predictability" was of the same order when the conditional probability for Hostile was calculated based upon the contribution of the same four S^F's identified in the baseline analysis (.1308). The contribution of the four S^F's in each instance is of the order of "one bit" of

information about Denny's future behavior. Knowledge of controlling stimuli may indeed contribute to an understanding of intraindividual variability.

A Search for Maintaining Stimuli

However, an examination of Denny's behavior suggested that much of the day-by-day fluctuations in rate of noxious behaviors was a function of extended bursts of chains (i.e., Figures 1 and 2 were Denny's). These and other similar findings underscored the need to understand the stimuli which govern extended coercive interactions.

In the first earliest attempts to analyze this problem (Patterson et al., 1967), it was mistakenly assumed that any consequence which increased the probability of recurrence of a response was probably a positive reinforcer. Therefore, responses which recurred in the immediately following time intervals were lumped together with those responses which recurred several hours, days, or weeks later. Either outcome was tallied as supporting "reinforcement effects." However, later experience with sequential data of this form suggests that there is no necessary relation between "reinforcement effects" on the one hand, and the immediate effect of a consequence upon ongoing behavior. For example, as noted by Skinner (1958), positive reinforcement following a "command" decreases the probability that the response will be repeated in the next few seconds. Similarly, in all but the completely inept, a "Talk" consequated by a kiss would be unlikely to produce further talking in the next few seconds. Data to be reviewed in this section show that responses under control of negative reinforcement control accelerate immediately following consequences which would ordinarily be classed as punishing.

Adequate description of ongoing social behavior seems to require its own simple language that bears little direct relation to traditional learning theories. Observations in the homes of 24 families from the clinical sample were analyzed to determine the consequences controlling the immediate recurrence of Talk and Hit (Patterson & Cobb, 1971). The samples of 56,632 Talk responses and 615 Hits were contributed by all family members. Sixteen consequences occurred with sufficient frequency ($\geq$ x 10) for "Hit" to be analyzed; of these, five were associated with significant alterations in the probability of Hits immediately recurring. The consequences, Attention, Comply, and No Response, were Decelerators for Hit, while Negativism and Hit were significant Accelerators. Given the latter as consequences, the conditional probabilities were .476 and .444 that Hit would recur six seconds later.

What was of particular interest was the fact that the consequences Negativism, Hit, Tease, Ignore, and Non-Comply all served as S^{r}'s and as Accelerators for Hit. These same events served to decelerate Talk. Apparently consequences do not have general effects on social behavior but rather are specific to the responses to which they are functionally related.

The generality of these findings is considerably enhanced by the replication study carried out by Kopfstein (1972). He used a derivative of the same sequential code system to record the free play activities of 14 retarded, preadolescent, children as they interacted in a classroom setting. His data showed that aversive consequences decelerated prosocial behaviors and accelerated coercive behaviors.

At the intraindividual level, the implication of these findings is that some coercive behaviors, such as Hit, may be primarily under the control of negative reinforcers. If Hit is followed by the withdrawal of the aversive stimulus being presented by the other family members, then the response tends not to recur in the immediate future. On the other hand, failure of the family member to withdraw the aversive stimulus could result in extended coercive interactions.

An analysis by Sallows (1972) of sequential data from an ORI sample included 15 clinical and 15 matched normal families. His data showed that for the normal boys, parent dispensed aversive consequences for the child's coercive behaviors decelerated the responses. The same set of consequences, when applied by parents of aggressive children, accelerated the coercive behaviors! These findings suggest that the garden variety punishments supplied by parents to control coercive behaviors not only are ineffective but actually lead to "bursts" of the very behaviors which they are employed to control!

The next step would seem to be that of an across subjects' analysis defining the consequences for each of the 14 noxious responses and the two classes, Hostility and Social Aggression. Such an analysis is currently underway.

Dyadic Interchanges Are Transactional

The position taken by many transactional theorists would be that in an extended dyadic interchange, the family members may have an impact upon the ongoing behavior of the child, but certainly the child must also have a simultaneous impact upon the family members (Bell, 1968). Given that this were true, it might also relate to the "burst" phenomena. For example, certain noxious behaviors of the child might set constraints upon the behavior of the other family members such that they are more likely to supply Accelerators which in turn keep the noxious behavior going. In effect, the "controlling" stimuli are themselves controlled. The

transactional problem again emphasizes the need to move to simple descriptive language. The symbols S and R in Figure 10 are simply not meaningful, e.g., all events are stimuli for other events.

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Insert Figure 10 about here
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To analyze such a question requires many extended interchanges of at least 12 to 18 seconds in which the same child and the same family agent interacted throughout.

Such an analysis was carried out using the 50 hours of baseline data for Denny with Hostile as the dependent variable (Patterson, 1973d). The independent variable consisted of the set of parent behaviors which had been shown to function as Accelerators for Denny's Hostile responses. Each point specified the probability of Hostile or ~ Hostile and Accelerate or ~ Accelerate. The data were sufficient only for the specification of three completed interchanges.

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Insert Figure 11 about here
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The data showed that when the parents supplied Accelerators that the effect was to produce very rapid acceleration from the baseline value of .1196 for his Hostile (Ho) behaviors to values around .500. Of even greater interest are the findings demonstrating that within the context of the interactions, Denny's behavior altered the probability that they would go on providing him with Accelerators. Given his initial Ho_1, the probability of Denny's parents employing an Accelerator was .286. Given that the Acc_1 had been followed by Ho_2, there was an even greater increase in the probability that the parents would provide an Acc_2: $p(Acc_2/Acc_1\text{-}Ho_2)$ value of .408. This was in contrast to $p(Acc_2/Acc_1)$ of .350. The slight increment in control over the behavior of the consequating agents was a surprising finding and to some extent counterintuitive. One might have expected, for example, that as the child continued with his noxious behavior the parents would be more likely to reciprocate with punishing behaviors other than "Talk."

As these preliminary analyses stand, they suggest the possibility of using stimulus control procedures to investigate transactional interchanges. Certainly they suggest a broadening of the traditional S-R formulation to include a transactional stance. This pilot analysis illustrates the feasibility of using the approach to explore these more complex models.

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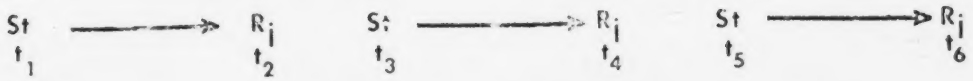
FIGURE 10

STIMULI: CONTROLLING OR CONTROLLED?

TRADITIONAL



TRANSACTIONAL

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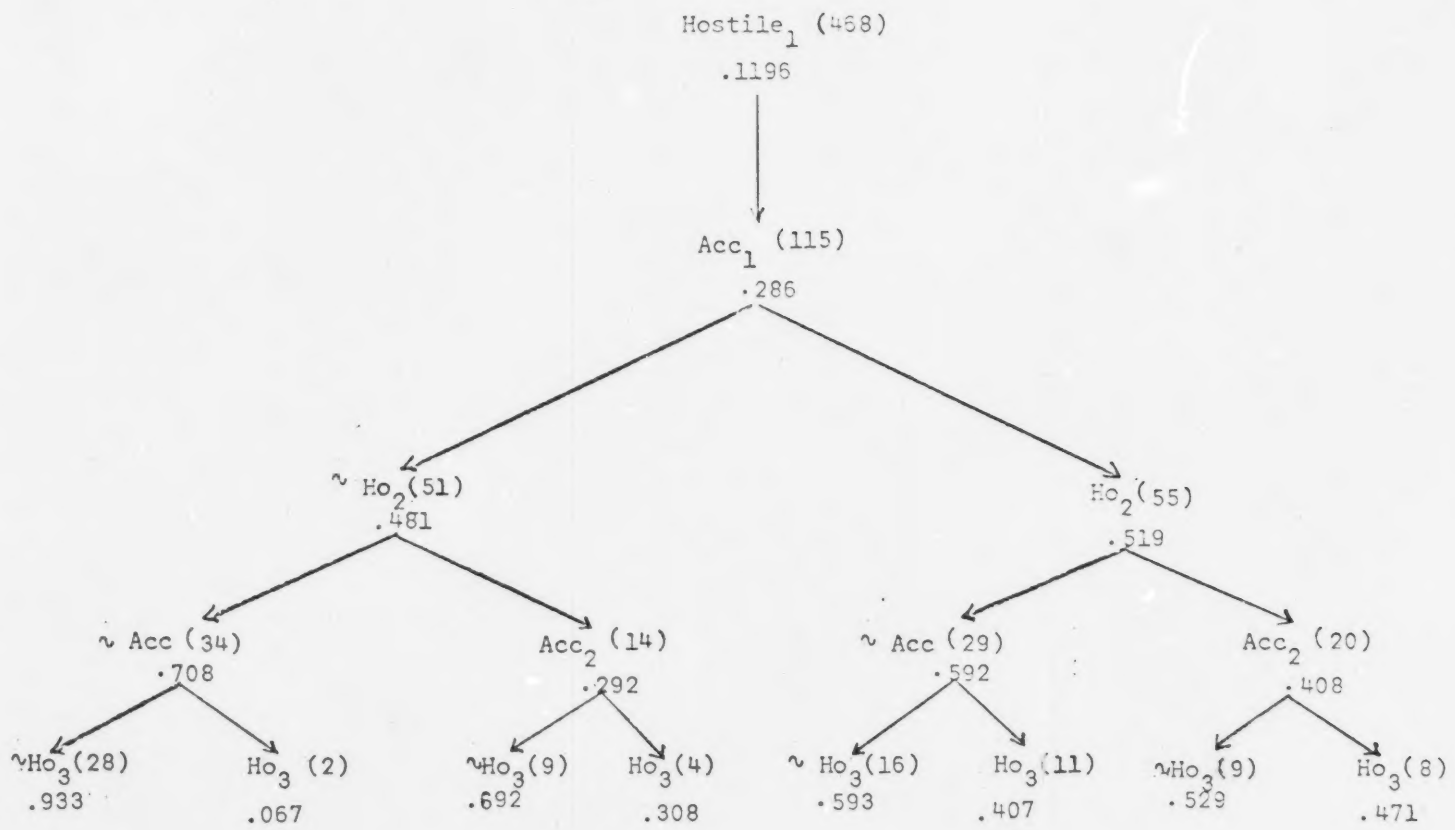
Figure 11

Probability Tree: Given Denny's $Ho_1 \longrightarrow Acc_1$



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Accounting for Intraindividual Variability

As stated earlier (Patterson & Cobb, 1973, p. 149), the necessary test for models of childrens' aggressive behavior is to be found in precise statements about the amount of variance to be accounted for is field observation data describing intraindividual variability (as well as inter-setting and subject variability). Laboratory analogue models about modeling or reinforcement must eventually be tested in the natural setting.

Several procedures seem feasible in making such tests. The increment in predictability for $p(R_i)$ which obtains when using information from controlling stimuli is one means. This is particularly powerful as a test if the same variables can be used to predict R_i at t_2. However, it is of some interest to explore the feasibility of using larger time intervals, e.g., five minutes or larger segments. In addition, it is of some interest to explore an estimate which could also be used to specify inter-subject and inter-setting variations accounted for by "determining" variables. One model which seems appropriate for all three sources of performance variations is that of multiple regression.

One study has been carried out thus far as a test of the feasibility of applying multiple regression analysis to intraindividual variability (Patterson, in preparation). Three analyses were run, for five-minute, 10-minute, and 20-minute intervals. The data subjected to a multiple regression analysis included Denny's rate of Hostile behaviors as the dependent variable. The corresponding rates for his four S$^+$'s and two S$^-$'s were the independent variables. To provide replication, the analysis was carried out separately for the baseline and the intervention data. Only those data were used in which both parents were present. The results for the analysis of the three different time intervals for baseline and treatment are summarized in Table 1.

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Insert Table 1 about here
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As a methodological note, it seems clear that for the covariations explored here, the 22 hours of observation data collected during treatment were insufficient to the task. In fact, the 50 hours of baseline data were barely adequate.

The data showed that for the lower time intervals, only 9% to 12% of the variance in the distributions of Ho scores are accounted for. As might be expected, an inspection of the raw data showed these distributions to be rather limited in range and skewed in form. For the largest of the covariation time interval, the data showed that six stimulus control variables

TABLE 1

Multiple Regression Analysis of Variation
In Denny's Performance of Hostile

	Data Source					
	Baseline			Intervention		
Time interval	R	F value	df	R	F value	df
Five minute	.295	2.01	6:127 < .08	.359	1.98	6:127 < .10
Ten minute	.393	1.83	6:600 > .10	.382	1.02	6:600 > .10
Twenty minute	.606	2.51	6:140 < .05	.461	.63	6:140 n.s.

accounted for 20% to 36% of the variance in distribution of Ho_2. The stimulus variables making the greatest contribution were "Mother/Command" and "Father/Negative Command." Both of these also served as S^1 for Hostile initiations. In general, the findings are viewed as supporting in that covariations in controlling stimuli seem significantly related to covariations in one class of noxious behaviors. These analyses also showed an increasing value for R as the time intervals increased from five to 20 minutes. However, the tradeoff was a decrease in the degrees of freedom.

Summary

An argument was made for a "performance" theory of childrens' noxious behaviors. It was assumed that most children in our society had been exposed to modeling and reinforcing contingencies such that they had learned most of the techniques in applying coercive behaviors. Children and settings, however, presumably differ with regard to the rates with which these behaviors are performed. Individual subjects also vary over time in the rates with which the behaviors occur.

It was proposed to search for immediately impinging stimuli which would be associated with altered probabilities in ongoing noxious behaviors. These stimuli were presumably to be found in various dyadic interchanges between the child and other family members. It was assumed that the stimuli associated with the initiation of noxious behaviors were not necessarily the same as those which correlate with the immediate recurrence or maintenance of these behaviors.

By way of illustration, studies based on across-subjects' data were reviewed which showed networks of controlling stimuli for many noxious behaviors observed in family interactions. There was some comparability among these networks for samples of aggressive boys and non-aggressive boys.

The data also showed the existence of several classes of noxious behaviors where the classes were formed by noxious behaviors under comparable stimulus control.

An extensive series of intraindividual data for one boy were used to replicate the stimulus network findings for noxious behaviors as well as the construction of response classes. The analyses were extended to include a search for maintaining stimuli for one response class. The interaction between extended interchanges of response class and maintaining stimuli were described in a probability tree. The latter demonstrated the impact of the environment upon the child as well as that of the child upon the environment. This mutual "altering" process presumably characterizes many dyadic interchanges.

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Finally, data were presented for the same subject which suggested that covariations in density of controlling stimuli accounted for 36% of the variance in a set of noxious responses over time for one sample, and 20% variance in another.

These pilot studies suggest the feasibility of pushing this approach further.

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2. It should be reiterated, however, that Ho is associated with the increased probability of occurrence for several of the controlling stimuli. This being the case, one would expect some covariation between "dependent" and "independent" variables.

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